



## A COMPARISON OF DIVERSITY OF MARINE FUNGI ON MANGROVE PLANTS AND MANGROVE ASSOCIATE AND THEIR FREQUENCY OF OCCURRENCE

**N. S. Pawar<sup>1</sup>, B. D. Borse<sup>2</sup> and D. S. Jain<sup>3</sup>**

<sup>1</sup>Dept. of Botany, S.S.V.P.S's Arts Commerce and Science College Shindkheda, 425406. M. S. India.

<sup>2</sup>Dept. of Botany, U.P. College Dahivel, Tal. Sakri, Dist.- Dhule

<sup>3</sup>Dept. Botany, GET's Arts and Science College Nagaon, Dist. Dhule 424005. M. S. India.

### Abstract:

A comparison was made of the diversity of marine fungi on five mangrove plants, (*Exocharia agalocha*, *Aegiceras corniculatum*, *Aegiatis rotundifolia*, *Ceriops tagle*, *Bruguiera gymnorrhiza* one salt marsh plants [*Suaeda maritima*] and one mangrove associate [*Acanthus ilicifolius*] co-habiting along with mangrove species in a Sajanakhali and Gosoba, Shankarpur 2, Basanti, Cannings, Bakkhali, Namkhana, and Ganga Sager cricks of Sundarbans. Thirty three species of marine fungi included in genera like *Aigialus*, *Arenariomyces*, *Ascocratera*, *Bathyscus* *Corollospora*, *Crinigera* *Dactylospora*, *Halorosellinia*, *Haiyanga*, *Kallichroma*, *Lignincola*, *Marosphaeria*, *Halosarpheia*, *Quintaria*, *Lulworthia*, *Sagaromyces*, *Thalassogena* and *Verruculina* among the *Ascomycota*, *Nia* from *Basidiomycota* and *Clavatospora*, *Periconia*, *Phoma*, *Phomopsis*, *Trichocladium* among the *Mitosporic* fungi. *Ceriops tagle* is host of eighteen marine fungi species, twelve species of marine fungi occur on *Exocharia agalocha*, rest of the mangrove host less than ten fungal species. The Frequency of occurrence of the isolated fungi species were also studied.

**Keywords:** Marine fungi, Mangrove plants, host.

### Introduction

India is very rich in its biological diversity, with huge flora and fauna. This richness is due to the impact of varied climatic and latitudinal coupled by variety of habitats. Of the nearly one lacks of fungi known around the world (Kirk et al, 2008). According to Kohlmeyer and Kohlmeyer (1979), "Obligate marine fungi are those that grow and sporulate exclusively in marine or estuarine habitat. Nearly 530 species of marine fungi reported from India included in 321 genera. Of which 424 *Ascomycota* (251 genera) 94 *Mitosporic* fungi (61 genera) and 12 *Basidiomycota* (9 genera).

Mangroves are considered as major niches of fungi. The fungal diversity is dependent on the age and diversity of the mangrove plants and the physico-chemical features of mangroves habitats; i.e. Temperature Salinity and tidal range (Jones, 2000). Much more information has been accumulated in last decades on diversity, taxonomy, distribution and ecology of mangrove marine fungi (Sarma & Hyde, 2001, Alias & Jones, 2009, Jones 2000). However, the comparison of diversity of fungi on mangroves plants was little known (Hyde 1990, Hyde et al. 1995). During the survey of marine fungi from the coast of Sundarbans, various mangrove samples were collected. And are observed for the occurrence of the marine fungi.

### Methodology

Plant material occurring in between intertidal zone was collected during low tide from the localities of Sundarbans like Gosoba, Sajanakhali, Shankarpur 2, Basanti Namkhana, Bakkhali and Ganga Sagar Island where *Exocharia agalocha*, *Aegiceras corniculatum*, *Aegiatis rotundifolia* *Bruguiera gymnorrhiza*, *Ceriops tagle* *Suaeda maritima* and *Acanthus ilicifolius* habiting. The lower part of these mangroves plants are periodically came across in the intertidal zone. The collected plant samples were washed with saline water for the removal of debris, mud, and put in the sterile plastic bags. The bags were incorporated with the naphtha ball to avoid the development of the borrowing animals, and then are air tightened with the help of rubber band and brought to the laboratory.

In the laboratory, preliminary observations of the samples were done for the occurrence of sporulating structures of the fungi. After preliminary observations the samples were incubated in the plastic boxes grounded with sterile sea sand and sea water. The incubated plant samples were periodically observed for sporulating structures.

The slides were prepared according to the Kohlmeyer and Kohlmeyer, 1972. The sporulating structures like *Ascomata*, *Asci*, and *Ascospores* were first mounted in the saline water and the stained with cotton blue and lactophenols. The identification of fungi was

carried out by using the Kohlmeyer and Kohlmeyer (1979), Kohlmeyer and Volkman-Kohlmeyer (1991), Sarma and Hyde (2000). The

permanent slides were preserved in the PG research centre in Botany, of SSVPS, A.S.C. College Shindkheda Dist.- Dhule.

**Table No. 1.** COMPARATIVE ACCOUNT OF MARINE FUNGI ON MANGROVE SPECIES

Sr. No.	Name of the fungi species	EA	AC	AR	CT	BG	AI	SM	FO
ASCOMYCOTA									
1	<i>Aigialus grandis</i> Kohlmeyer and Schatz	+	--	--	--	+	--	--	1.78
2	<i>Aigialus parvus</i> Schatz and Kohlmeyer	+	--	--	--	--	--	--	5.58
3	<i>Arenariomyces parvulus</i> Koch	--	--	--	--	--	+	--	0.23
4	<i>Ascocratera manglicola</i> Kohlm.	+	--	--	--	--	--	--	2.49
5	<i>Bathyascus avicenniae</i> Kohlmeyer	--	+	--	--	--	--	--	0.23
7	<i>Corollospora colossa</i> Nakagiri & Tokura	--	+	--	--	--	--	--	1.3
8	<i>Corollospora gracilis</i> Nakagiri & Tokura	--	--	--	--	--	+	--	1.3
9	<i>Corollospora pulchella</i> Kohlm., Schmidt & Nair	--	--	--	--	--	+	--	3.31
10	<i>Crinigera maritima</i> Schmidt	--	--	--	+	--	--	--	047
11	<i>Dactylospora heliotrepha</i> (Kohlm.) (Kohlm & Kohlm.) Hafellner	+	--	--	+	--	--	--	2.02
12	<i>Haiyanga salina</i> (Meyers) Pang and Jones	--	--	--	+	--	--	--	5.23
13	<i>Halorosellinia oceanica</i> (Schatz) Whalley et. al.	+	+	+	+	+	--	+	7.25
14	<i>Halosarpheia fibrosa</i> Kohlm. & Kohlm.	--	--	--	+	--	--	--	0.35
15	<i>Kallichroma tethys</i> (Kohlm. & Kohlm.) Kohlm & Volk. Kohlm.	+	--	--	--	--	+	--	0.83
16	<i>Lignincola laevis</i> Hohnk	--	--	--	+	--	--	--	5.00
17	<i>Lulworthia grandispora</i> Meyers	--	--	+	+	--	--	--	2.24
18	<i>Lulworthia sp.</i>	--	--	--	+	--	--	--	0.59
19	<i>Marosphaeria velatospora</i> (Hyde and Borse) Suetrong et.al.	--	--	--	+	--	--	--	0.35
20	<i>Quintaria lignatilis</i> (Kohlm) Kohlm & Volk. Kohlm	--	--	--	+	--	--	--	0.47
21	<i>Sagaromyces abonnis</i> (Kohlm.) K.L. Pang & E.B.G. Jones	+	--	--	+	--	--	--	0.95
22	<i>Sagaromyces ratnagiriensis</i> (S.D.Patil & Borse) K.L. Pang & E.B.G. Jones	--	--	--	+	--	--	--	0.59
23	<i>Thalassogena sphaeriaca</i> Kohlm & Volk. Kohlm	+	--	--	--	--	--	--	0.59
24	<i>Verruculina eanlia</i> (Kohlm.) Kohlm. & Volk. -Kohlm.	+	+	+	+	+	+	+	13.3
BASIDIOMYCOTA									
1	<i>Nia Vibrissa</i> Moore and Meyers	+	--	--	--	--	--	--	2.37
MITOSPORIC FUNGI									
1	<i>Clavatospora bulbosa</i> (Anasatiou) Nakagiri & Tubaki	--	--	--	--	+	+	--	2.37
2	<i>Halenosporium varia</i> (Anastasiou) Jones	--	--	--	+	+	--	--	1.9
3	<i>Periconia prolifica</i> Anastasiou	+	+	+	+	+	+	+	13.3
4	<i>Phoma suadae</i> Jaap	--	--	--	--	--	--	+	0.35
5	<i>Phoma sp.</i>	--	--	--	--	--	--	+	0.83
6	<i>Phomopsis mangrovei</i> Hyde	--	--	--	+	--	--	--	0.35
7	<i>Trichocladium constrictum</i> Schmidt	--	+	--	+	--	--	--	1.07
8	<i>Zalerion maritimum</i> (Linder) Anastasiou	+	+	--	+	--	--	--	2.85
	<b>Total</b>	12	07	05	18	04	07	05	

EA: *Exoecharia agalocha*; AC: *Aegiceras corniculatum*; AR: *Aegialitis rotundifolia*; CT: *Ceriops tagle*, BG: *Bruguiera gymnorrhiza* AI: *Acanthus ilicifolius* and SM: *Suaeda maritima*. FO: *Frequency of occurrence*

## Results

The table -1 shows the marine fungi isolated from the five mangrove species isolated from the Sundarbans region of the West Bengal. Total 33 species of marine fungi were recorded from the five mangroves, one mangrove associate and one salt marsh host studied. It includes 18 genera including 24 species of Ascomycota *Nia vibrissa* from Basidiomycota and six genera including eight species from the Mitosporic fungi. Only four species were common to all five mangrove host. These are *Dactylospora heliotrepha*, *Halorosellinia oceanica*, *Verruculina eanlia* and *Periconia prolifica*.

**Exoecharia agalocha:** This mangrove is the host of twelve marine fungi these are *Aigialus grandis*, *A. parvus*, *Ascocratera manglicola*, *Dactylospora heliotrepha*, *Halorosellinia oceanica*, *Sagaromyces abonnis*, *Kallichroma tethys*, *Thalassogena sphaeriaca*, *Verruculina*

*eanlia*, *Nia vibrissa*, *Periconia prolifica* and *Zalerion maritimum*.

**Aegiceras corniculatum:** From this mangrove host, seven marine fungi like *Bathyascus avicenniae*, *Corollospora colossa*, *Halorosellinia*

*oceanica*, *Verruculina eanlia*, of Ascomycota and *Periconia prolifica*, *Trichocladium constrictum*, and *Zalerion maritimum* of Mitosporic group were isolated.

**Aegialitis rotundifolia:** This mangrove is the host of five marine fungi species like *Halorosellinia oceanica*, *Lulworthia grandispora*, *Lulworthia species*, and *Verruculina eanlia* from Ascomycota and *Periconia prolifica* among the Mitosporic fungi occurs.

**Ceriops tagle** is the most common host of Eighteen species of marine fungi, these are; *Aigialus grandis*, *Crinigera maritima*, *Dactylospora heliotrepha*, *Haiyanga salina*, *Halorosellinia oceanica*, *Halosarpheia fibrosa*,

*Lignincola laevis*, *Lulworthia grandispora*, *Marosphaeria velatospora*, *Quintaria lignatilis*, *Sagaromyces abonnis*, *S. ratnagiriensis*, *Verruculina enalia*, *Ascomycota group and Halenosporium varia*, *Periconia prolifica*, *Phomopsis mangrovei*, *Trichocladium constrictum* and *Zalerion maritimum*, from Mitosporic group.

**Bruguiera gymnorrhiza** is host of only four marine fungi species, were isolated, these are *Verruculina enalia* *Clavatospora bulbosa*, *Periconia prolifica* and *Halenosporium varia*.

**Acanthus ilicifolius:** It is the Mangrove associate and is the host of seven marine fungi species like *Arenariomyces parvulus*, *Corollospora gracilis*, *Corollospora pulchella*, *Verruculina enalia* *Clavatospora bulbosa* *Periconia prolifica*, and *Halenosporium varia*.

**Suaeda maritima:** The salt marsh plant is substrate of the five marine species fungi, like *Halorosellinia oceanica*, *Verruculina enalia*, *Periconia prolifica*, and the host specific *Phoma suadae*

Of the Mangrove host plant studied **eighteen** species on *Ceriops tagle*, **twelve** species occur on *Exoecharia agalocha*, **seven** species on *Acanthus ilicifolius*, and *Aegialus corniculatum* respectively. **Five** species of marine fungi occur on *Aegiatis rotundifolia* and *Suaeda maritima* respectively and only **four** species occur on *Bruguiera gymnorrhiza*.

Regarding the frequency of occurrence, *Verruculina enalia* and *Periconia prolifica* was the most frequent fungi [13.3] followed by *Halorosellinia oceanicum* [7.25], *Zalerion maritimum* [2.85] *Nia vibrissa*, and *Clavatospora bulbosa* [2.37], *Lulworthia grandispora* [2.24], *Halenosporium varia* [1.9] and *Aigialus grandis* [1.7].

### Acknowledgement

I am thankful to authorities of UGC (WRO) Pune for the financial assistance during the study, I am also grateful to the Honbl'e Chairman Bapusaheb P. M. Sisode for the inspiration and laboratory permission during the research work.

### References

- Alias, S., A, Jones EBG. (2009) – Marine fungi from mangroves of Malaysia. University of Malaya, Kuala Lumpur. *Botanica Marina* 53, 545–554.
- Hyde KD. (1990) – A comparison of intertidal Mycota of five mangrove tree species. *Asian Marine Biology* 7, 93–107.
- Hyde, K., D., Lee, S., Y. (1995) – Ecology of mangrove fungi and their role in nutrient cycling.

What gaps occur in our knowledge? *Hydrobiologia* 295, 107–118.

Jones EBG. (2000) – Marine fungi: some factors influencing biodiversity. *Fungal Diversity* 4, 53–73.

Kirk, P. M. Cannan P. F. Minter D.W. Stalpers J.A. (2008) *Directory of Fungi* (CAB International Publishers).

Kohlmeyer, J., and E. Kohlmeyer, 1972. Permanent microscopic mounts, *Mycologia*, 64:666-669.

Kohlmeyer, J and Kohlmeyer, E. (1979) *Marine Fungi: The Higher Marine Fungi* (Academic Press, New York), pp689.

Kohlmeyer J, Volkmann-Kohlmeyer B. (1991). Illustrated key to the filamentous higher marine fungi. *Bot. Mar.* 34:1-61.

Sarma V. V. and K. D. Hyde (2000) *Pictorial Key to Higher Marine fungi in Marine Mycology- A Practical Approach* Edited by K.D. Hyde and S. Pointing (Fungal Diversity Press Research Series-I University of Hong Kong) pp205-270.

Sarma V. V, Hyde KD. (2001) A review on frequently occurring fungi in mangroves. *Fungal Diversity* 8, 1–34.